III. REMARKS

Claims 1, 2, 5-13, 16-27, 41-44 and 47-57 remain pending and under examination. Applicants respectfully request favorable reconsideration and allowance of the application in view of the amendments and remarks provided herein.

Claims 1, 2, 5, 6, 8-13, 16, 17, 19-27, 47-50 and 52-57 have been rejected under 35 U.S.C. §103(a) as being as being unpatentable over Robinson, *et al.* (United States Patent No. 5,580,532) in view of Myles, *et al.* (United States Patent No. 4,240,833). Applicants respectfully traverse the rejection.

It is alleged that Robinson provides the claimed apparatus, except that it is silent as to the support element being made from ceramic fibers having the physical properties of fibers that are formed according to the claimed time-temperature heating regimen. However, it is also alleged that Myles teaches the ceramic fibers lacking in Robinson, *et al.*, and that it would have been obvious for one skilled in the art to substitute the fibers of Myles for the fibers of the Robinson apparatus. Applicants respectfully disagree.

In the response mailed March 25, 2008, Applicants argued, *inter alia*, that it would not have been obvious to combine Myles with Robinson because a reasonable expectation of success for use of the fibers disclosed by Myles in the apparatus of Robinson was lacking. It is alleged that Myles describes ceramic fibers that would possess all of the desirable characteristics described in Robinson, and therefore one skilled in the art could combine the elements to yield a combination yielding nothing more than predictable results. It is also alleged that the fibers of Myles would be suitable for use in dynamic environments because Robinson discloses that the catalytic converter may be used in a "static" environment such as an exhaust stack. Claim 1 has been amended to recite a "device for the treatment of automotive exhaust gases". With regard to the second allegation, the ability of the ceramic fibers of Myles to bend is not sufficient to suggest their usefulness in stressed automotive environments. The ability of the fibers to bend is only relevant during the assembly process,

such that the mat does not crack when wrapped around the periphery of the monolith. However, the ability of the fibers to bend is not germane to the holding pressure capability of the mounting mat. The holding pressure is attributed to the resistance of the mat to take on a permanent compression set during operation. Because Myles does not teach or suggest the use of its material under a dynamic (e.g., automotive) environment, there is no reasonable expectation of success if the ceramic fibers of Myles were used in the apparatus of Robinson.

Robinson does not disclose, suggest, or provide motivation to utilize melt-formed ceramic fibers to prepare a support element for an exhaust gas treatment device. Robinson discloses that suitable fibers for use in preparing a mounting mat include polycrystalline ceramic oxide fibers prepared in accordance with United States Patent No. 4,159,205 and United States Patent No. 4,277,269. These references only teach sol-gel processes preparing polycrystalline ceramic oxide fibers. The disclosed sol-gel processes involve fiberizing fibers from a solution of dissolve ceramic oxide precursor material.

In contrast to the sol-gel processes that involve fiberizing solutions of ceramic oxide precursor materials, the fibers utilized in the support element of the presently claimed exhaust gas treatment device are prepared by melt-forming processes. Melt-forming involves the melting of solid ceramic oxide precursor material to form a melt of ingredients and forming fibers by a technique, such as blowing, drawing, or spinning. In contrast to the sol-gel processes, the melt-forming processes do not involve dissolving ceramic oxide precursor materials in a solution and then fiberizing the solution. On the other hand, the Myles reference supplies no teaching or suggestion whatsoever regarding the use of sol-gel fibers or that its melt-formed fibers are a functional equivalent.

The present support element comprises melt-formed ceramic fibers. Robinson simply does not disclose, suggest, or provide motivation to prepare ceramic fibers by a melt-forming process, such as melting-blowing or melt-spinning processes, or use the melt-formed ceramic fibers in the manufacture of support elements for exhaust gas

treatment devices. Thus, the prior art does not teach or suggest all of the presently claimed limitations. In addition, Robinson does not disclose or suggest the claimed percent crystallinity or crystallite size of the fibers of the presently claimed support element.

Robinson's disclosure of characteristics of a mounting mat such as good handleability, the capability to withstand high temperatures without degradation while maintaining a stable pressure over a wide range of operating temperatures, flexibility, and the ability to maintain structural integrity, do not supply the motivation to modify the apparatus of Robinson to substitute the ceramic fibers of Myles. Myles is directed to blankets and mats for furnaces in a static environment – Myles *does not address holding forces.* Therefore, it not predictable that a melt-formed blanket of Myles would have the adequate holding force as described in Robinson when Myles does not even address holding force issues and the fiber of the Robinson mat is of a different material (sol-gel fibers). Without any factual substantiation, the Office Action presumes that a sol-gel fiber based mounting mat (as described in Robinson) is equivalent to a melt-formed fiber blanket for furnaces (as described in Myles) even though neither reference discloses such a relationship.

As recited in the independent claims, the support element of such a device must be capable of providing a holding pressure of at least 4 psi after 200 cycles of testing at 900°C or at least 10 psi after 1000 cycles of testing at 750°C. There is no reasonable expectation that a material developed as furnace insulation, which is not required to exert holding pressures, would function to provide requisite holding forces as a support element, particularly in view of the relatively unpredictable properties of chemical materials. Moreover, there is absolutely no teaching in Myles that the material could retain holding pressure if used as a support element under the dynamic conditions of automotive exhaust gas treatment devices.

The Office Action further alleges that the presently claimed holding pressure would be inherent, "because shrinkage is at a minimum, a mounting mat formed from the ceramic

fibers of Myles would predictably maintain a stable pressure on the fragile structure within the housing of Robinson." Applicants unequivocally deny that the holding pressure of the currently claimed mounting mat is inherent in the Myles teaching. Resistance to shrinkage is a different and independent property of the material than its ability of provide sufficient holding pressure. The holding pressure of the support element is a result of the heat treatment so that the element does not experience a permanent compression set. Nevertheless, and without acquiescing to the Examiner's position, Applicants submit "that which is inherent in the prior art, if not known at the time of the invention, cannot form a proper basis for rejecting the claimed invention as obvious under §103." See *In re Shetty*, 566 F.2d 81, 86, 195 U.S.P.Q. 753, 756-57 (C.C.P.A. 1977). Because neither references teach or suggest a material that was known to provide the claimed holding pressure, the references do not provide all of the limitations of the claims and therefore do not establish a *prima facie* case of obviousness.

Finally, it is alleged that the Applicants have not provided evidence demonstrating that the ceramic fibers of Myles would not successfully operate within the mechanical and/or thermally dynamic conditions described in Robinson. Applicants respectfully note that rebuttal evidence is not required unless a *prima facie* case of obviousness has been established. To establish a case of *prima facie* obviousness under 35 U.S.C. §103(a), there must be (1) a suggestion or motivation to modify a reference, (2) a reasonable expectation of success, and (3) the modification must teach or suggest all of the claim limitations. In the present case, it has not established a *prima facie* case of obviousness for the reasons provided above, and therefore Applicants are under no burden to demonstrate that the ceramic fibers of Myles would not operate under the conditions described in Robinson.

However, while Applicants are under no burden to provide evidence of inoperability, there is good reason to believe that the material of Myles would be unsuited for use in preparing the claimed exhaust gas treatment device, for at least the reason that the material described by Myles does not include a binder. Binders are described from page 16, line 28 to page 19, line 5 in the present specification, and function to initially bond the fibers

together to allow them to hold together while the fiber mat is handled (e.g., placed around the ceramic monolith of the catalytic converter). While material without a binder may be suitable for application to large relatively flat structures such as furnace walls, a binder is required for material to provide have sufficient handleability to wrap it around a structure with a more irregular geometry, such as the ceramic monolith of a catalytic converter. Without a binder, it is unlikely to be able to wrap the mat of Myles around the monolith. Furthermore, because Myles discloses a suitable flexibility, there would be no motivation to add an exogenous binder to impart flexibility.

Claims 7, 18, 41-44 and 51 have been rejected under 35 U.S.C. §103(a) as being as being unpatentable over Robinson in view of Myles, and in further view of Sasaki, *et al.* (JP 07-286514). Applicants respectfully traverse the rejection.

It is alleged that it would have been obvious to maintain a shot content of less than about 10% in the ceramic fibers forming the support element/mat in the modified apparatus of Robinson, on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because when larger amounts of shot are present in the ceramic fiber, the specific gravity of portions of the support element/mat increases, and thermal conductivity becomes uneven, resulting in an inability to evenly hold the fragile structure, as taught by Sasaki. It is further alleged that it would have been obvious to provide needling to the support element/mat in the modified apparatus of Robinson, on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the needling orients some of the ceramic fibers in the vertical direction to tightly bind the support element/mat, so that the bulk density of the support element/mat is increased and separation or shifting of the layers of the support element/mat can be prevented, as taught by Sasaki.

Of significance, Sasaki does not teach, suggest, or provide motivation to heat treat ceramic fibers under a time-temperature regimen of (i) heat treating said fibers at a temperature of at least 990°C to less than about 1050°C for greater than one hour, or (ii)

heat treating said fibers at a temperature of greater than 1050°C for a time effective such that the fibers have at least about 5 to about 50 percent crystallinity as detected by x-ray diffraction, and have a crystallite size of from about 50Å to about 500Å, or the claimed minimum holding force.

Claims 1 and 12 of the present invention recite that the ceramic fibers of alumina and silica are melt formed ceramic fibers. Robinson is limited to the use of sol-gel derived fibers in the formation of a support element for exhaust gas treatment devices. Moreover, Robinson discloses that polycrystalline oxide ceramic fibers are used for preparing the mounting mat of the catalytic converter, and that suitable polycrystalline oxide fibers are contained in U.S. Patent Nos. 4,159,205 and 4,277,269. These two U.S. patents are directed to sol-gel processes for preparing ceramic oxide fibers from solvent solution. See column 5, lines 50-64.

Sasaki discloses that the fibers are formed by a sol-gel process whereby an organic binder such as polyvinyl alcohol, alumina sources such as alumina oxychloride, silica sources such as silica sol, and water are mixed together and then spun into an alumina fiber precursor. Sasaki simply does not disclose or suggest that melt formed ceramic fibers are useful in the formation of a support element for exhaust gas treatment devices.

Furthermore, the aluminosilicate fibers of the support element are melt formed fibers and comprise from about 40 weight percent to about 60 weight percent alumina and from about 60 weight percent to about 40 weight percent silica. By contrast, the fibers of Sasaki are strictly limited to fiber compositions having a weight ratio of Al_2O_3:SiO_2 of 70:30 – 74:26. See Abstract (Pages 1 and 2); Claim 1; and Page 4, Lines 3-7. Sasaki expressly teaches that when Al_2O_3:SiO_2 ratio is not in the range of 70:30 – 74:26, fiber deterioration occurs prematurely and the fibers do not withstand long usage. See Page 4, Lines 4-7. In view of the teachings of Sasaki, there is no disclosure, suggestion, or motivation to utilize aluminosilicate fibers having a weight ratio of Al_2O_3:SiO_2 that is outside of the range of

70:30 – 74:26 in the formation of a support element for an exhaust gas treatment device. Accordingly, Applicants respectfully submit that because Sasaki fails to provide any teaching of what would occur outside of the weight ratio it has disclosed, it is not combinable with either Robinson or Myles. It is also not combinable with Myles for the additional reason that Myles only teaches melt-formed fibers.

Finally, to the extent that Myles and Sasaki are combinable, there would nevertheless be *no motivation to add an exogenous binder* to the Myles fiber. This is because Myles teaches a fiber that is sufficiently flexible without the addition of a binder.

In view of the above remarks, Applicants respectfully request withdrawal of all pending rejections, and further request the issuance of a formal notice of allowance directed to claims 1, 2, 5-13, 16-27, 41-44, and 47-57. Should the Examiner have any questions regarding the remarks presented in the present response, Applicants' undersigned attorney would welcome a telephone call.

Respectfully submitted,

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